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ABSTRACT

Three empirical studies were conducted to investigate the hypothesis that the "easy to see" construction (such as in the sentence "children are hard to understand") is acquired at a younger age than the 7-9 year range reported by previous studies (Cambon and Sinclair, 1974; Chomsky, 1969; 1972; Cromer, 1970; Kessel, 1970). Four-year-olds were found to have some partial knowledge of this construction, and five-year-olds comprehended it correctly. Thus, the hypothesis of an earlier age of comprehension was supported. Other findings were that: (1) partial knowledge of the four-year-olds appears to be a function of the aspectual properties of the infinitive verb used in the sentence; these children were usually correct on sentences containing point action verbs (e.g., find and catch) and incorrect on sentences with process verbs (e.g., draw, see and hear); (2) violation of the Minimum Distance Principle is not the sole determiner of this construction's relative difficulty, as previous authors have maintained; the crucial feature appears to be its lack of a stated agent; and (3) there is a necessary but not sufficient relation between acquisition of the passive and of this structure. Results are discussed in terms of their implications for the acquisition of this particular structure as well as for the general problem of detecting "competence" from linguistic performance. (Author/CFM)

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When are children hard to understand?

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Carol Chomsky (1969) was the first to report that constructions of the form "Children are hard to understand" are consistently misunderstood by children younger than 8 years of age; younger children tend to interpret such sentences to mean that "children cannot understand." Several other investigators (Cambon and Sinclair, 1974; Cromer, 1970; Kessel, 1970) have corroborated this finding using a variety of comprehension tasks. The convergence of results from different studies would indicate that correct interpretation of this construction is in fact a delayed acquisition. However, an analysis of the tasks used in the studies cited above reveals that each of them has involved numerous extralingusitic processes additionally to the language comprehension process itself; therefore, younger children's failure could have been due to their incompetence at these extralinguistic skills rather than to their lack of language comprehension. The hypothesis of the three empirical studies I will report on today was that when the extralinguistic factors are controlled or eliminated, the observed age of comprehension will be significantly lower than the 8 years reported by most previous studies.

Time does not permit the analysis of each of the tasks which have been used in the assessment of children's comprehension of this construction. My own task in the first study was designed to eliminate the extralinguistic aspects of Chomsky's task; therefore, I will analyze that one in some detail. In that task the child is presented with a blindfolded doll and is asked: "is the doll easy to see or hard to see?" Two interpretations of this question are possible: one is the correct one, namely whether the child can easily see the doll, and the other is the incorrect one, namely whether the doll can easily see. The task environment clearly biases the child toward the incorrect interpretation; that is, everything in the situation tells him that he is being questioned about the doll's seeing. Thus, the blindfold functions as a misleading element which the child must overcome in order to arrive at the correct answer.

This aspect of the task parallels the distinctive feature of Piaget's concrete operational tasks, which characteristically also contain a misleading element (Pascual-Leone, 1976a, 1976b). For example, in conservation of liquid, the child must overcome the appearance of inequality (cued by the inequality of heights) in order to construct the correct solution that the amount of liquid in the two containers is in fact equal. Interestingly, children tend to pass Chomsky's blindfolded doll task during the concrete operational years (Palermo and Molfese, 1972). These parallels in the task structure and in the age norms obtained suggest that the relatively delayed age of comprehension reported by Carol Chomsky may have been due to the difficulty younger children have in overcoming a misleading element. Thus, the first question of interest is how children would perform when the misleading component is eliminated by creating a task environment which does not differentially weight either the correct or the incorrect solution. The task I am about to describe was designed to be a neutral analogue of Chomsky's misleading task. At least two other "neutral" variants of the blindfolded doll task have been previously proposed; however, neither of these are adequate according to the criterion that a neutral task environment should provide equal support to both the correct and the incorrect solutions. In one task (Chomsky, 1972) the child is presented with a doll whose eyes are

closed and is asked the target questions. While this task reduces the salience of the misleading element, it does not eliminate it. In another task, (Morsbach and Steel, 1976) the doll was placed behind an opaque barrier. In this case there is no conflict between the correct and incorrect answers;thus this task is inappropriate.

Study 1

Children were first trained on two response alternatives: laying the doll down so its eyes would close and hiding the doll behind a small barrier. They were then told that they would play a game in which a puppet would tell them to perform one of those two actions; the game for the child was to perform the correct action after each command. The commands were of the form: "Fix it so...target sentence," e.g. "Fix it so...the doll is hard to see." Thus, after each sentence the child is given a clear choice of two possible interpretations; whether the sentence means that the doll cannot see, in which case the correct action is to lay it down, or whether it means that we cannot see the doll, in which case the correct action is to hide it. Children heard 15 sentences which were tape recorded in a predetermined order.

The stimulus sentences were chosen to allow us to isolate the syntactic feature or features which contribute to the relative difficulty of this construction. Its complexity has been attributed to its violation of the Minimum Distance Principle (MDP), the rule of English which commands that the noun or pronoun prior to the verb is the subject of the verb. Whether the violation of the MDP is in fact the source of this construction's relative difficulty has never been investigated empirically. At least two other characteristic features are possible contributors to its difficulty. One is the absence of a named agent; since the agent is not explicitly stated, its identity must be supplied mentally and this could result in processing complexity. The second characteristic is what I've termed the presence of a "misleading set." This is a situation where the initial portion of the sentence sets up expectations which are violated by the later portions, requiring the reprocessing of the entire sentence. For example, up to the moment when only "the doll is hard.." is processed, "the doll" is the subject. This expectation is violated with the addition of the verbal infinitive "to see."

The target sentences administered in this study were chosen so as to vary along these three features, namely, congruence with or violation of the MDP, presence of absence of an explicitly stated agent, and congruity or incongruity of the initial segment of the sentence with its later portions. Table 1 lists the stimulus sentences used and their characterization on these three syntactic features. ("The baby is hard to see" is referred to as the standard, and the others as the variant sentences. It can be seen that the first three variants were constructed by adding the agentive "for us" to the beginning, middle or end of the standard sentence.)

If the MDP was the critical feature, the pattern of pluses and minuses in column 1 of Table 1 should predict the subjects's responses: that is, subjects should fail every sentence which violates the MDP and succeed on every sentence which is congruent with it.

In addition to these target sentences, subjects heard two "neutral" sentences. These directed the child to perform each of the two actions (hiding the doll and closing its eyes) but were syntactically simpler. These sentences were: "the doll cannot see: and "we cannot see the doll." These sentences were used to ensure that children could separate out the two actions required of them and could in fact perform those actions in response to a syntactically simpler command. Only children who correctly responded to these commands were chosen as subjects, since only against this baseline success can failure on any of the target sentences be attributed to syntactic factors. The neutral sentences were also repeated throughout the testing session in a predetermined order to ensure that children were attending to each command.

The subjects were 33 children ranging in age from 3;6 to 6;11. All were native speakers of English.

In analyzing the results, two questions are of interest. The first question is: how many children were correct in their responses to the standard sentence, which was "fix it so...the doll is hard to see." Table 2 presents this information. It can be seen that the majority of the 4, 5 and 6 year olds were correct in their interpretation of this command, that is, they correctly placed the doll behind the barrier. This confirms the main hypothesis of the study that when the misleading component is eliminated the observed age of language comprehension is considerably lowered. (It should be mentioned that the small number of 3 year olds in the sample is due to the fact that most 3 year olds tested could not correctly perform the neutral sentences. They tended to perform the same action, be that hiding the doll or closing its eyes, to both sentences.)

The second question of interest is whether subjects's response pattern on the variant sentences corresponded to the predictions derived from the MDP. In order to answer this question, we need to look at the response pattern of those subjects who were correct on only some of the target sentences presented. This group is small in number (N=8) and therefore the results are suggestive rather than definitive. Individual subjects's responses are reproduced in Table 3 along with the predictions which follow from each of the three syntactic features. Inspection of these results reveals that none of the subjects responded according to the pattern which would indicate adherence to the MDP. None of the subjects seemed to be consistently effected by the presence of a misleading "set" and one subject (#8) was always aided by the presence of a named agent. Another possibility is that subjects can profit from the addition of the agent, but only in certain sentential positions, be that the beginning or the end of the sentence they hear. One can obtain this information by looking at subjects's responses on variants 1, 2 and 3 which were generated by adding the agentive "for us" to various sentential positions. It can be seen that all but one subject (#7) responded correctly when the agentive was in one of those positions. In fact about half of the subjects (#1-3) seemed to prefer the sentence-final positions whereas the other half (#4-6) preferred the sentence initial positions. These data suggest that if anything, the crucial feature of this construction is the absence of an explicitly stated agent. Its violation of the MDP does not appear to be the critical feature. It should be emphasized, however, that these data are only suggestive because of the small number of subjects involved and because sentence-type was a within-subject variable.

The main result of this first study was that the observed age of acquisition is 4 years rather than the 7-9 range reported by previous studies. The magnitude of this age difference caused me to wonder whether children could have succeeded on my task in any way other than through syntactic knowledge. Unfortunately for me, the answer appeared to be "yes." For a transitional child, who is unsure of the meaning of "the doll is hard to see," the most likely response is hiding the doll, because when it is hidden we cannot see it and it cannot see very much either. The correct response is thus possible through response resolution rather than through syntactic knowledge alone. Study 2 was conducted to investigate this possibility and to ensure that the observed age of comprehension is in fact due to syntactic knowledge. In addition, a range of linguistic stimuli was used, by including a variety of verbs and adjectives.

Study 2

The task was the following. Children were individually read a cartoon story about two familiar characters who engaged in some familiar action, such as hide and seek, catch, or talking on the telephone. Page 3 of the handout presents one of these stories. After each story children were asked two questions to ensure that they understood the events of the story--these are referred to as "neutral" questions. These were who questions; children responded to naming or pointing to the appropriate participant. After these two questions (the order of which was counterbalanced across stories and subjects) children heard the target question which was of the form: "Who was easy/hard/fun inf.vert?" Children heard six stories. Page 4 of the handout contains a summary of the stories and lists the questions asked after each story. The target constructions were: hard to find, hard to hear, hard to draw, hard to save, fun to watch and easy to catch. At the end of all the stories, if the child was still cooperative he was also asked some passive questions (which are also listed on page 4). The relation between the passive and the target construction is of interest because the passive also violates the MDP and because one previous study (Cromer, 1970) has found no relation between knowledge of the passive and the target construction.

Subjects were 46 children ranging in age between 3;6-6;11.

Subjects's responses to each target question were scored 0 or 1 for incorrect and correct respectively. Thus, a subject's score could range between 0 and 6. Table 4 lists the distribution of scores for each age group. It can be seen that the passing age is 5; most 5 and 6 year olds answered all target questions correctly. Three and 4 year olds tended to be transitional--correct on some items and incorrect on others. These results confirm the main hypothesis of the study that the passing age will be lower than what has previously been reported and support the response resolution interpretation of the results of Study 1. They also raise the question of whether the partially correct responses of the younger subjects were due to guessing or were reflective of some partial syntactic knowledge. This question was investigated through two analyses.

The first was to look at whether these intermediate subjects tended to be correct on the same items, that is, whether the items scaled in difficulty. Table 5 lists the total percent correct obtained on each item. These can be divided into three difficulty levels. An analysis of individual subjects's responses revealed that these items follow a Guttman scale; if a child was correct on a higher difficulty item, he was likely to be correct on the lower difficulty items as well ($z=2.37$; $p=.05$). Such consistency is not likely to be the result of guessing on the part of these intermediate subjects.

For a second analysis of the nature of the transitional responses, 20 transitional subjects were given a retest two weeks after their initial testing. On any one item a subject's retest result was the same or better than it had been on the test. Table 6 presents this information. It can be seen that out of 114 responses there was only one false positive response on the test as compared with the retest. This test-retest data is remarkably consistent, suggesting that this particular comprehension task is a good one for assessing children's syntactic knowledge. In this study, the partially correct responses were in fact reflective of some underlying partial syntactic knowledge and were not the result of guessing or of response vacillation as others (e.g. Cromer, 1970) had observed.

This leads to the question of what that partial knowledge is, or why it is that some items were easier than were others. The scaling of items does not appear to be dependent upon the particular adjective used, since the most difficult item (hard to hear) as well as the easiest one (hard to find) contained the same adjective. It appears that item difficulty is dependent upon the verb used. The more difficult verbs (which were watch, hear and draw) differ from the easier ones (catch, find, save) in that they are not necessarily transitive whereas the easier ones are; semantically, the former group expresses a durative process action whereas the latter expresses a point action. A similar scaling of the verbs was obtained on the passive questions of this study as well as in a previous study on the comprehension of the passive (Sinclair, Sinclair and deMarcellus, 1971). This feature of the actions expressed may also explain why Cromer (1970) obtained somewhat lower age norms than did the other studies cited: his target sentences contained the verb "bite" whereas most other studies used the verb "see." It is not entirely clear how this aspectual property of the verbs determined the difficulty of the target construction. It may be that questions about the object of a process action are more difficult to answer than are questions about the object of a point action because process actions in a sense "emphasize" the subject, who is both the actor and the experiencer. If this was the case who-object questions containing process verbs ought to be more difficult than are who-object questions with point action verbs. What we need now is a model of how these syntactic/semantic distinctions between different verbs are acquired and how they enter into sentence processing.

To briefly summarize the results on the passive questions, it appears that a correct response on the passive was necessary but not sufficient for a correct response on the corresponding target question. Table 7 presents this information. The necessary but not sufficient relation between these two constructions is a strong empirical finding; whether it represents a similar psychological relation between the two is a question which will have to be answered through further research.

Study 3

In order to ensure that the differences between C. Chomsky's results and my own were not due to sample differences, a third study was conducted in which both tasks were administered to the same group of 21 7 year olds. These children were individually administered the blindfolded doll task and the two most difficult cartoon story questions (hard to hear and fun to watch). Fifty % of the subjects were correct on Chomsky's task, which is about the same as the success rate she reports for this age group, while 95% were correct on both cartoon story questions. Thus, the decalage between the two tasks was not due to sample differences. Furthermore, there was some indication in this data that performance on Chomsky's task was a function of the child's cognitive style (field dependence/independence). These results confirm the hypothesis that the delayed age of comprehension observed by C. Chomsky' (1969) was a function of the misleading nature of the task she used and that the observed age of comprehension is considerably younger.

Conclusions

1. The "hard to see" construction does not appear to be an after-five acquisition. Most children by the age of five years understand it and even four year olds comprehend some instances of this structure. Numerous questions have been left unanswered: Why do younger children misinterpret some or all instances of this structure and how is the correct interpretation acquired?

2. In more general terms, these studies illustrate the fact that language performance is a function of a variety of task variables and therefore conclusions about underlying competence should not be made on the basis of any one task or a limited range of language stimuli.

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HANDOUT

When are children hard to understand?

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TABLE 1

Target sentences of Study 1 and their syntactic characteristics

Sentence type	Sentence	MDP	Agent	Set
Standard	The baby is hard to see.	-	-	-
Variant 1	For us, the baby is hard to see.	-	+	+
V 2	The baby is hard for us to see.	+	+	-
V 3	The baby is hard to see for us.	-	+	-
V 4	It's hard to see the baby.	+	-	+
V 5	For us, it's hard to see the baby.	+	+	+

Note: the minus sign indicates that the sentence is incongruent with the MDP, does not explicitly state the agent, and its initial segment leads to an expectation which is disconfirmed by its latter segment. The plus signs refer to the reverse.

TABLE 2

Percentage of children at each age level who responded correctly to all target sentences of Study 1

3;0-3;11	4;0-4;11	5;0-5;11	6;0-6;11
1/2	9/11	9/12	7/9
	81%	75%	77%

TABLE 3

The distribution of correct and incorrect responses obtained (top part) and expected on the basis of each syntactic feature (bottom part)

Subject #	S	V1	V2	V3	V4	V5
1	-	-	-	+	-	+
2	-	-	+	+	+	+
3	-	-	-	+	-	-
4	-	+	+	-	+	+
5	-	+	+	-	+	+
6	-	+	+	-	-	+
7	-	-	-	-	+	+
8	-	+	+	+	-	+
Predictions by strategy						
MDP	-	-	+	-	+	+
Agent	-	+	+	+	-	+
Set	-	+	-	-	+	+

Note: All subjects who were correct on the standard sentence were also correct on all variants; thus the above table presents the responses of those who were incorrect on the standard.

Snoopy, can you do any tricks?
Sure. I can do lots of tricks.
I can walk on a ball...
and I can dance...
What else can you do?
Look at this!
and I can do handstands...
Look at me!
Yipee!
I'm sure having a good time
And how about this?
These are good tricks
Oh you're really funny. Now you're imitating a TV antenna
Have a Coke
You sure are the funniest dog I know!

Summaries of the stories and the questions asked:

Abbreviations: TQ: target question
PQ: passive question
OQ and SQ: "neutral" questions--the answer to the OQ was the participant who is the object of the target question, while the answer to the SQ was the subject of the target question. The order of OQ and SQ was counterbalanced.

Story A. Snoopy is doing tricks and Lucy is having a good time watching.

SQ: Who was looking at the tricks?
OQ: Who was doing the tricks?
TQ: Who was fun to watch?
PQ: In this story who was being watched?

Story B. Linus and Charlie are playing tag. Charlie runs after Linus and tags him right away.

SQ: Who won the game?
OQ: Who wasn't running fast enough?
TQ: Who was easy to catch?
PQ: Who is tagged at the end?

Story C. Linus and Snoopy are playing hide and week. Snoopy hides in the tall grass and Linus can't find him.

SQ: Who was counting and looking?
OQ: Who was hiding?
TQ: Who was hard to find?
PQ: Who is found in the end?

Story D. Charlie tries to draw a picture of Linus, but he can't make the picture look like Linus.

SQ: Who was drawing the picture?
OQ: Who did he try to make a picture of ?
TQ: Who was hard to draw?

Story E. Linus is stuck in a tall tree and Charlie tries to get him down. Charlie tries several methods before he finally reaches Linus.

SQ: Who was helping out?
OQ: Who was stuck in the tree?
TQ: Who was hard to save?
PQ: Who is saved in the end?

TABLE 4

Age distribution of children's scores in Study 2

Score	3;6-3;11 N=5	4;0-4;11 N=17	5;0-5;11 N=11	6;0-6;11 N=13
0-1	20%	35%	0%	0%
2-4	40%	30%	9%	15%
5-6	40%	35%	91%	85%

TABLE 5

Percentage of correct responses on each item

Difficulty level	Sentence	% correct responses
1	hard to find	83%
	easy to catch	84%
2	hard to save	77%
	hard to draw	68%
3	fun to watch	58%
	hard to hear	54%

TABLE 6

Test-retest responses per item (number of responses in each cell)

		Retest response: correct	Retest response: incorrect
Test response	correct	58	1
	incorrect	17	38

Note: 6 responses could not be counted because the subject did not correctly answer the neutral questions on either the test or the retest. Hence, the total number of responses included is 114 rather than the 120 expected.

TABLE 7

Children's responses on a target question and on its corresponding passive question

(number of responses in each cell)

		Target question: correct	Target question: incorrect
Passive question	correct	54	18
	incorrect	1	27